

## UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S)	Weigler, et al.	GROUP ART UNIT:	1725
APPLN. NO.:	10/695,187	EXAMINER:	Jonathan J. Johnson
FILED:	10/28/2003	Confirmation No.	4286
TITLE:	VERTICAL REMOVAL OF EXCESS SOLDER FROM A CIRCUIT SUBSTRATE		

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DECLARATION OF ROBERT BABULA  
UNDER 37 CFR 1.132

Sir:

I, Robert Babula, declare that:

1. I am a citizen of the United States of America and a resident of New Braunfels, Texas.
2. I hold a B.S. Mechanical Engineering from the University of Massachusetts 1986.
3. I have been employed as an Engineer by Motorola, Inc. since 1993 and am currently a Principle Staff Engineer working in the Automotive Group of Motorola, Inc. During my 12 years at Motorola and 20 years combined experience in electronics assembly, I have worked continually with manufacturing technologies, including circuit manufacturing techniques.
4. I have reviewed U.S. Patents Nos. 3,580,462 (Reynolds) and 5,143,272 (Carlomango), hereinafter collectively termed "prior art."
5. I have reviewed the Specification, Claims, and Drawings of the Application Serial No. 10/695,187.
6. I have reviewed U.S. Patent Office Action dated 18 January 2006 in Application Serial No. 10/695,187, which contains the statement, "Applicant is invited to submit an affidavit or declaration showing how using a vacuum would damage the circuit board."
7. This affidavit is submitted in response to the Examiner's request for further information on why using a vacuum would damage the circuit board.

Based upon my review of the Specification, Claims, Drawings, the prior art, and the Office Action, I am of the opinion that the vacuum device of Carlomango would damage a circuit substrate. The Carlomango reference describes a desoldering device that has a removable vacuum source for utilizing vacuum to suck melted solder into a collection chamber of the desoldering device. Carlomango, col. 4, lines 39-49. Further, the Carlomango reference


describes the use of a heater that is embedded in the tip of the vacuum cartridge so that the tip can blow hot air during the desoldering process. As such, this description refers to the use of vacuum and heat to remove solder from a circuit board. The desoldering device of Carlomango has a hole that sucks the solder from a circuit board that utilizes vacuum and heat.

Applicants' claimed invention relates to utilizing "wicking the excess solder vertically onto the pads of the sacrificial circuit substrate by capillary action." The Carlomango reference does not describe nor is it related to using "capillary action" to remove solder in any way. The Carlomango reference describes vacuum suction and not capillary (wicking) action. As is known to one of ordinary skill in the art, capillary (wicking) action is a natural mechanism whereby a liquid is moved along a substrate. For example, molten wax moves by capillary action up a candle wick. As can be understood, such an action does not involve vacuum suction.

In contrast, vacuum suction may cause circuit board lifting because of the extremely high vacuum generated and the jarring (e.g. lateral movement) caused by the vacuum suction. As such, utilizing the desoldering device of Carlomango may cause damage to the circuit board. As cited in the background section of Applicants' application, care must be taken so that removal of residual solder from a circuit substrate does not cause damage to the circuit substrate, e.g. a solder mask on the circuit substrate. As noted in the background, the solder mask used between connections is delicate and flexible and can be damaged if any lateral movement occurs during the removal of a BGA package from the circuit substrate. Thus, any process for removing excess solder must not cause damage to the solder mask on the circuit substrate.

Accordingly, one skilled in the art would not utilize the vacuum suction of Carlomango to perform removal of excess solder where damage to the circuit substrate is of concern. Accordingly, the technology described in the Carlomango reference can not be used for the removal of excess solder as claimed in Applicants' application.

Respectfully submitted,

  
ROBERT BABUI A

DATE: 3/20/2006